

VII.—*On Some Deposits of Titaniferous Iron Ore in the Counties of Haliburton and Hastings, Ontario.*—BY E. J. CHAPMAN, PH.D., LL. D.

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Numerous deposits of iron ore, chiefly the magnetic oxide, occur throughout the Counties of Victoria, Haliburton, Peterborough and Hastings, in Ontario. These deposits are, for the greater part, if not wholly, in the form of irregular masses, or "stocks," mostly of large dimensions, associated with dark-green pyroxenic or hornblendic rock-matter, in gneissoid strata of Laurentian age. The iron ore, therefore, of this district occurs under conditions closely similar to those of the great iron region of Arendal, in Norway, both as regards its chemical nature and conditions of occurrence, and its association with hornblendic or pyroxenic matter,—the latter appearing in many cases partly to surround or enclose the iron ore, as in the so-called "Skölars" or "Stockscheiders" (*i. e.*, sheathed stocks) of Swedish and German miners. In Haliburton and adjacent counties, these stocks appear to lie, as a rule, in belts or zones of country extending in a general westerly and easterly direction.¹ A belt of this kind, forming a comparatively high and broken range of considerable breadth, lies on each side of the stream known as Burnt River, in the townships of Snowdon, Glamorgan, Monmouth and Cardiff, and extends into Hastings County in the townships of Faraday and Dungannon.

In the range immediately south of Burnt River, the ore is chiefly of coarse-granular texture, while in the more northern range the ore presents a remarkably crystalline and cleavable structure. So striking are these structural peculiarities that one might almost infer the existence of some deeply-seated connection between the separate deposits of each respective range, were it not for the presence of a large amount of titanium in one of the deposits, while in other places the ore is absolutely free from the slightest trace of that metal. In this immediate district the titaniferous ore occurs in the more southern of these two ranges; but, as far as my observations go, at one spot only, known as the "Pine Lake location." This is on lot 35 of the fourth concession of Glamorgan, about half a mile south of Burnt River, and a couple of miles, or rather less, south of the Monk road. The mineral at this spot forms an enormous deposit of black magnetic ore, of granular texture, rising abruptly in an immense ledge, or succession of ledges, to a height of from eighty to one hundred feet above the general level of the ground. It is exposed in an easterly and westerly direction, over a length of at least 1,800 feet, with an average width of about 140 feet. Actual measurements vary from seventy feet in some places to 198 in others. Variations of this kind are found to occur more or less in all stock-formed deposits, owing to the ir-

¹ Those known to the writer, from personal inspection, occur chiefly as follows:—In Snowdon: lot 33, concession 3; lots 26, 27, con. 4. In Glamorgan: lot 34, con. 2; lot 35, con. 4; lots 30, 31, con. 13; lot 27, con. 15. In Monmouth: lots 6, 7, con. 1; lot 6, con. 4; lot 5, con. 5; lots 7, 8, con. 6; lot 30, con. 13. In Herschel: lot 32, con. 1. In Faraday, near Bancroft village. In Dungannon: Lot 29, con. 13.

regular form of the ore-mass. The average specific gravity of the ore equals 4.437. The amount of ore practically above ground cannot be less, therefore, than from 200,000 to 300,000 Canadian tons. An analysis made from samples of ore taken from different parts of the deposit gave me the following results :—

ORE DRIED at 212° F. Sp. Gr.=4.437.

Fe ² O ³	71.87=Fe	52.04%
Ti O ² —13.30=Ti ² O ³	12.01=Ti	8.11%
S.....	0.06	
P.....	Trace	
Ca CO ³	0.86	
Pyroxenic rock-matter.....	15.28	
	100.08	

The ore-deposits of other portions of this iron range south of Burnt River, and all the deposits in the range immediately north of the river, are quite free from titanium; but some small deposits of magnetic ore, in which a certain amount of titanium is present, occur to the north of this northern range, in the township of Minden.

Turning now to the south-east of this section of country, we find in the township of Tudor, in North Hastings (lots 55–57 of the Free Grant district) a large deposit of titaniferous magnetite, very similar in character to the Pine Lake ore. This deposit, known as the Louise Mine, is also in the form of an immense stock, or irregular mass, the principal axis of which extends in a direction a little north of east. It forms a steep slope or ridge, rising above the general surface of the ground to an average level of nearly one hundred feet. Trenches opened across the face of the slope, at different levels, show the ore-mass to extend in width from sixty feet in some places to over 160 feet in others, but outlying exposures indicate a still greater extension; while the length of the deposit in an easterly and westerly direction exceeds 1,400 feet. The ore itself is of a granular texture, black, and strongly magnetic, with specific gravity varying from 4.45 to 4.48.

An analysis, from a sieved amount of ore weighing several pounds, gave results as follows :—

ORE DRIED at 212° F. Sp. Gr.=4.48.

Fe ² O ³	83.36=Fe	60.36%
Ti O ² —8.08=Ti ² O ³	7.30=Ti	5.03%
P.....	Trace	
S.....	0.08	
Pyroxenic rock-matter.....	9.31	
	100.05	

This titaniferous deposit, like that in Glamorgan, lies in the more or less immediate vicinity of iron ore deposits, in which no trace of titanium can be detected. Some of the more important of these comprise the so-called Emily Mine, on lots 6–8 of the nineteenth concession of Tudor; the Baker Mine, on lot 18, concession 18, of the same township; and the Batchelor Mine, on lots 15, 16, of the eighth concession of Wollaston. Analyses of these and other iron ores from this district of Ontario will be found in a paper, by the writer, communicated to the chemical section of our Society.